GREEN & SMART HOMES TO SAVE THE PLANET

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What are Green Buildings?

- **Green building** (or **sustainable building**) Uses

  structure and processes that are **environmentally friendly and resource-efficient** throughout a **building's life-cycle:**

  from choice of site to design, construction, operation, maintenance, renovation, and demolition

What are Smart buildings?

- A smart building is an **attempt to integrate building technology and energy systems**.
- This will include

  building automation,

  life safety,

  telecommunications,

  user systems and

  facility management systems.

Why Green Buildings ?

Global Warming and Climate changes are threatening the very existence of life on the planet earth

What is Global Warming?

- Global warming is the **gradual heating of Earth's surface, oceans and atmosphere**. Since the late 1800s earth's average temperature has risen by 0.8 degrees Celsius) over the past century(EPA). **Temperatures are projected to rise another 1.133 to 6.42 degrees C over the next 100 years.**
- Most of the leading scientific organizations in the world agree that the rate of global warming trends the planet is now experiencing is not a natural occurrence, but is **primarily the result of human activity.**

What happens if temperature rises?

- **Ice is melting** worldwide, at the Earth's poles. This includes mountain glaciers, ice sheets covering West Antarctica and Greenland, and Arctic sea ice.
- **Sea level rise** became faster over the last century
- **Extinction and decline of several animal species** :
- Certain types of **penguins on Antarctica**, the numbers have fallen from 32,000 breeding pairs to 11,000 in 30 years.
- Some **butterflies, foxes, and alpine plants** have moved farther north or to higher, cooler areas.
- **Precipitation (rain and snowfall) has increased** across the globe, on average.

Other effects if this continues

- **Sea levels are expected to rise between** 18 and 59 cms by the end of the century, and continued melting at the poles could add between 10 to 20 centimeters.
- **Hurricanes and other storms are likely to become stronger**.
- **Species that depend on one another may become out of sync**.
- plants could bloom earlier than their pollinating insects become active.
- **Floods and droughts will become more common**
- **Less fresh water will be available**., leaving thousands of people who rely on it for drinking water and electricity without a source of either.
- **Some diseases will spread,** such as malaria carried by mosquitoes.
- **Ecosystems will change—some** species will move farther north or become more successful; others won't be able to move and could become extinct.

Causes for global warming

- **Green house effect**
- Global warming begins with the greenhouse effect, which is caused by the interaction between the Earth's atmosphere and incoming radiation from the sun.

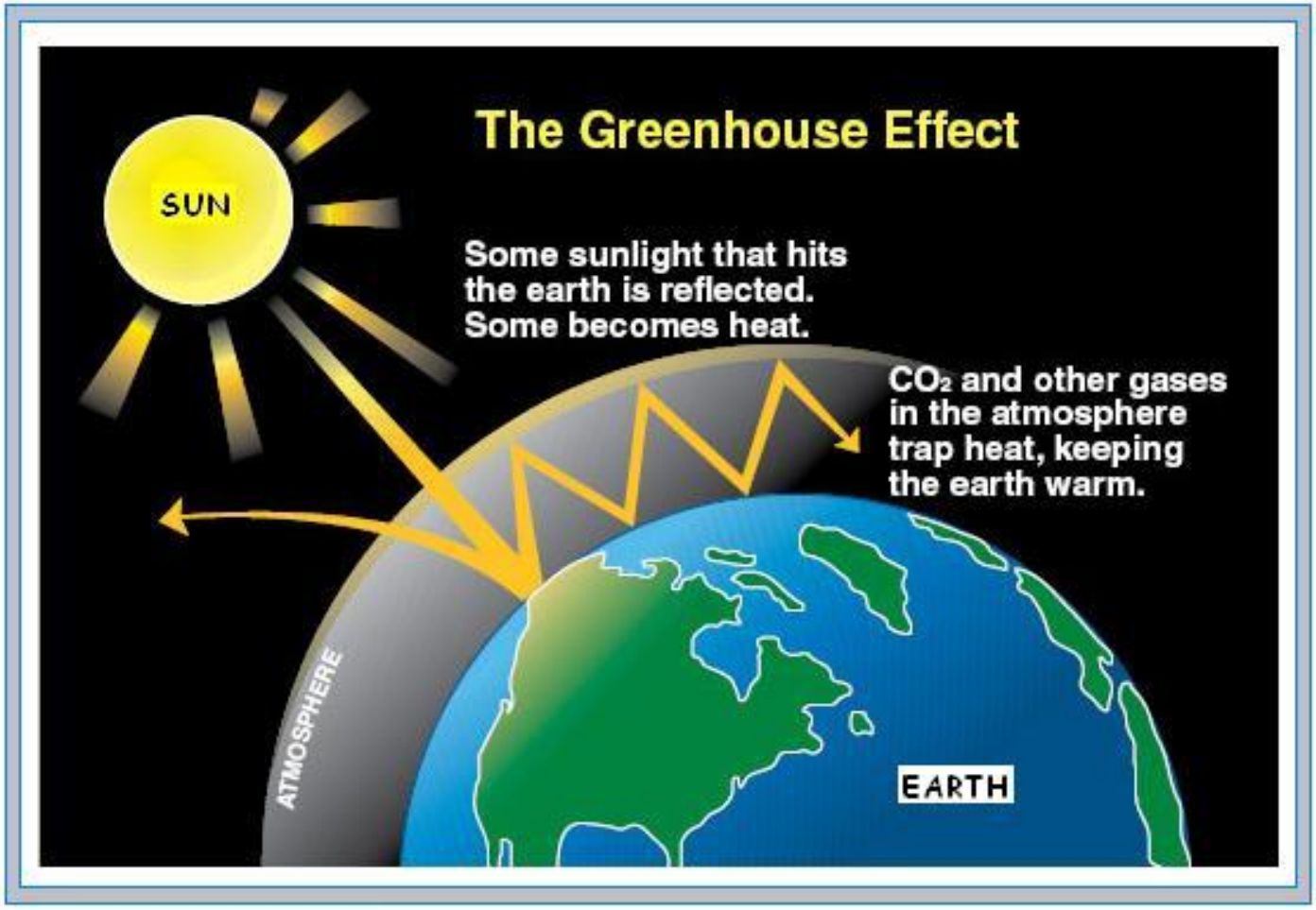
- Even though presence of certain amount of green house gases **is essential for keeping** the earth warm, excessive green gases create problems

Effects of Global warming !!

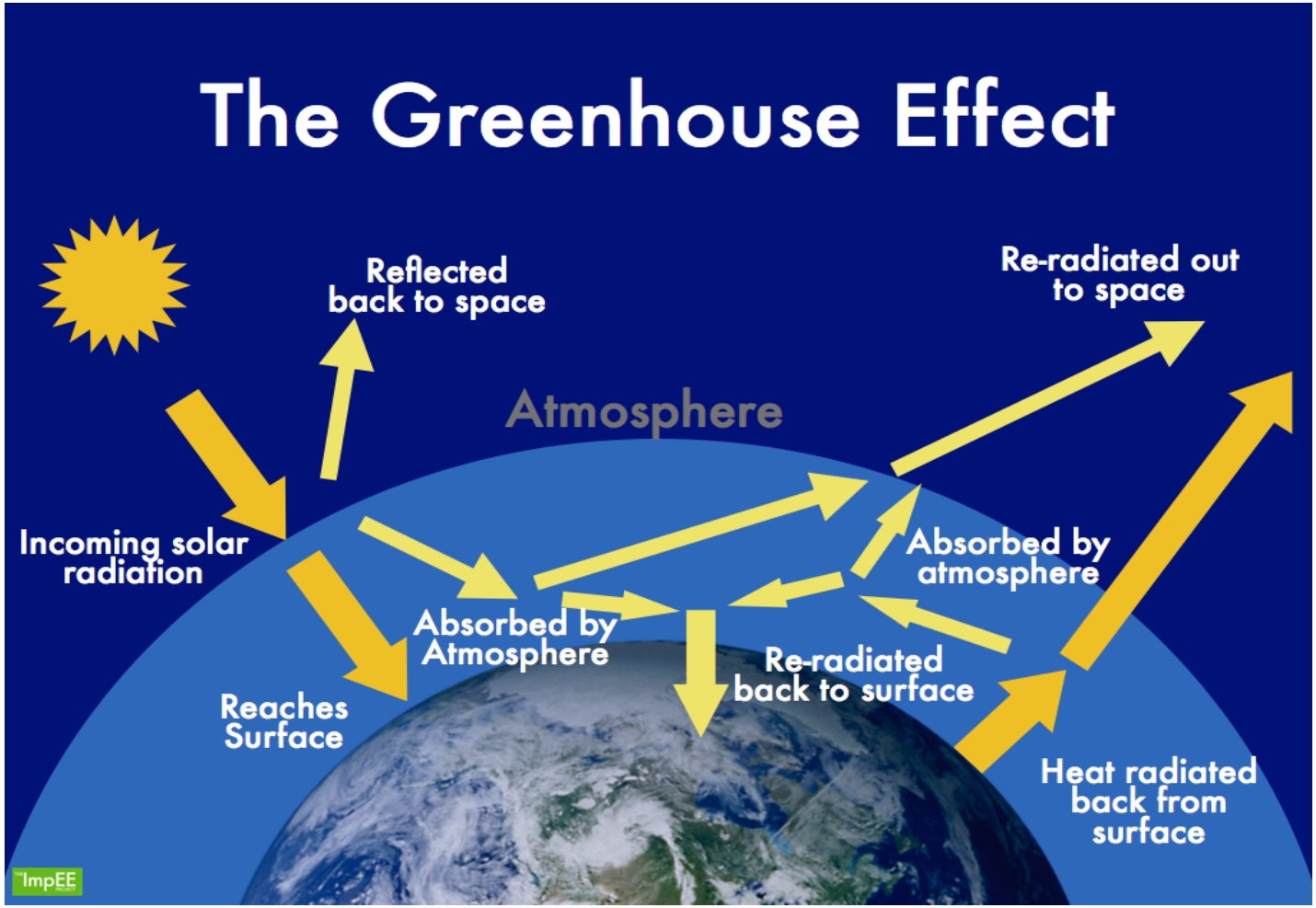
- Significant increase in global temperature results in Climatic changes
- If the global temperature increase by 2C Severe floods and tornados in some places
- Extremely high temp in some areas and drought in other places.
- Melting of ice in Arctic and Antarctic
- If the same rate of green gas emission continues, global temp will increase by 6C at the end of century, if so :
- Rain forests will disappear.
- Ocean water level rise by 2-3 meters
- Inundation of low lying areas like Bangladesh, Florida and Lakshadveeps and even Kuttanad in Kerala
- Large number of animals species on land and ocean will disappear

What are green house gases?

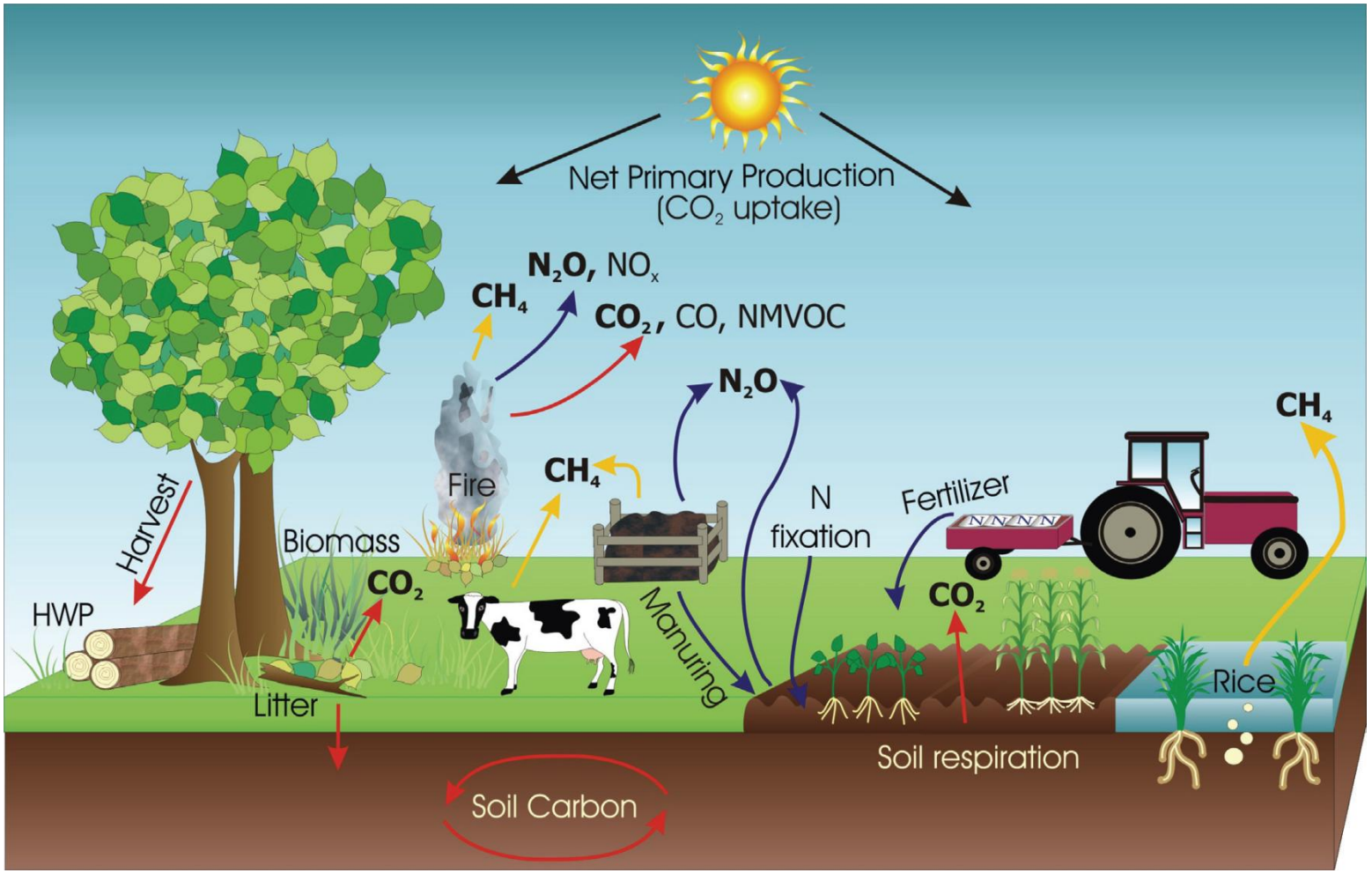
- The atmospheric gases responsible for the greenhouse effect are known as "greenhouse gases"
- These include
- **Water vapour,**
- **Carbon dioxide (CO_2),**
- **Methane (CH_4) and**
- **Nitrous oxide (N_2O).**
- **The major component of greenhouse gas is CO_2.**
- CO_2 during the past 800,000 years including ice ages varied between 180 ppm- 280 ppm
- Before Industrial Revolution, it was about 280 ppm ,
- **Currently, the increase is 100 times faster than before**


The Greenhouse Effect
SUN
Some sunlight that hits the earth is reflected. Some becomes heat.
CO_2 and other gases in the atmosphere trap heat, keeping the earth warm.
ATMOSPHERE
EARTH

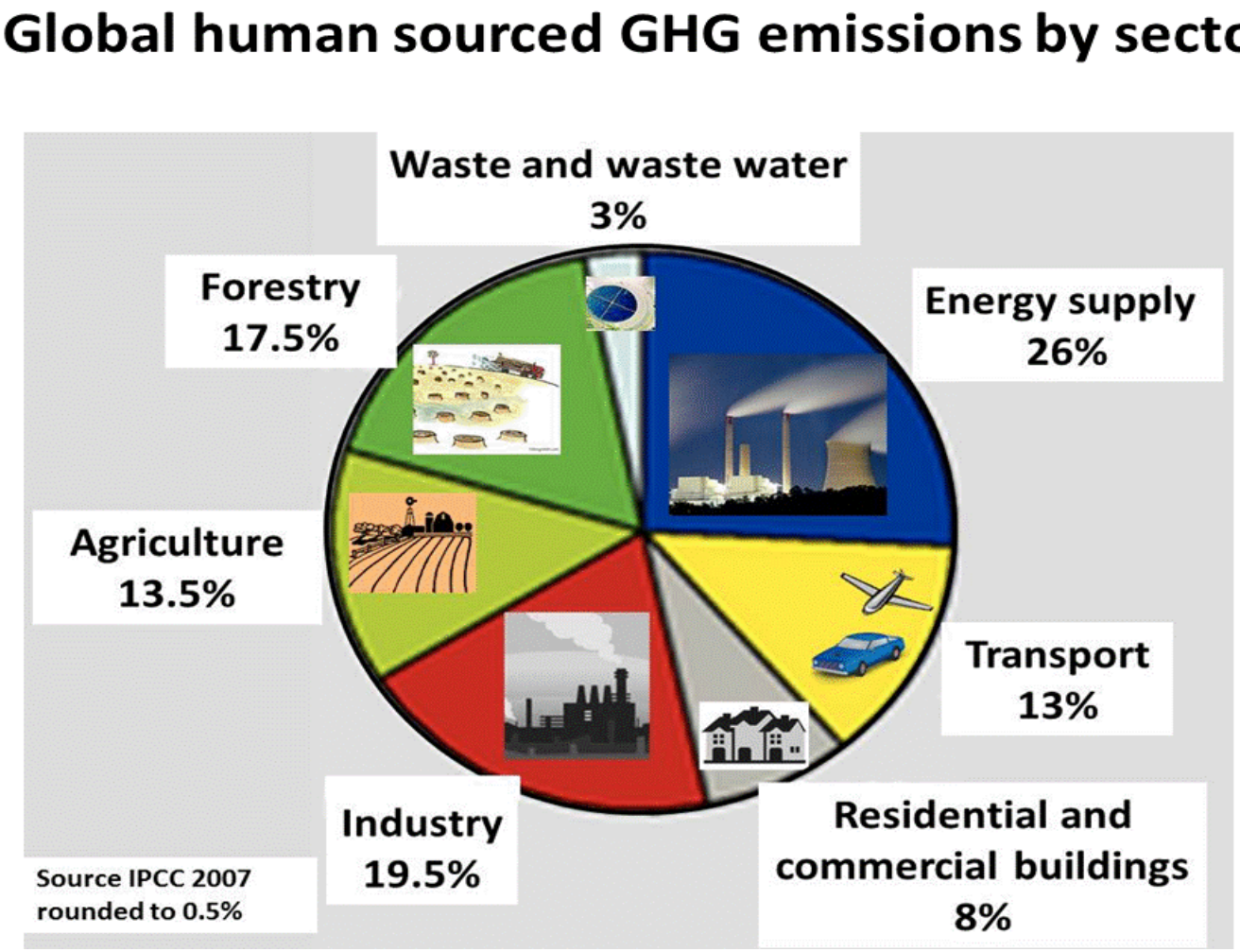
Green house effect



Sources of green house gases



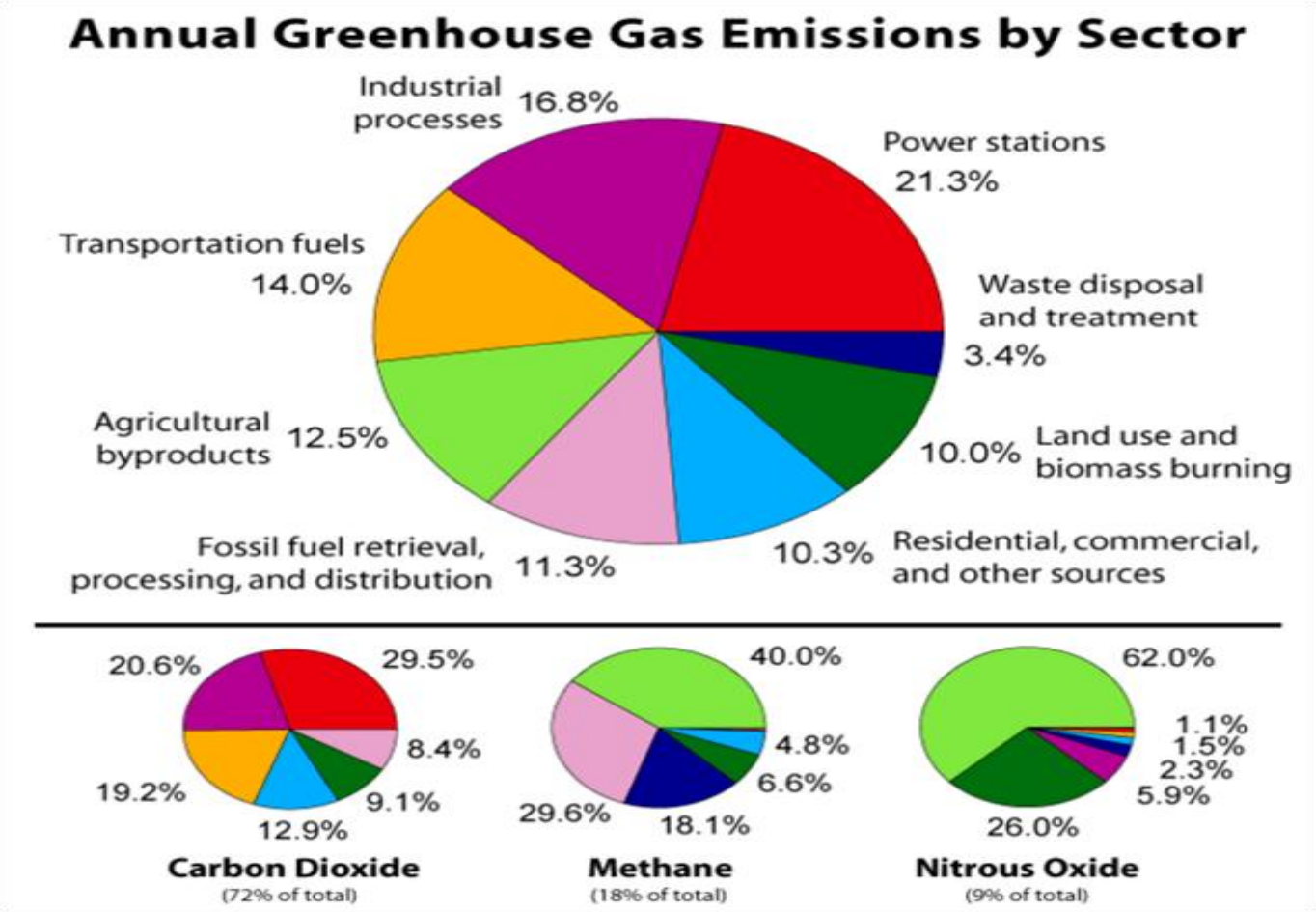
Human Sectors contributing GHG



To reduce green house gases

1. Reduce, Reuse, Recycle. ...
2. Use Less Heat and Air Conditioning. ...
3. Change Your Light Bulbs. ...
4. Drive Less and Drive Smart.
5. Buy Energy-Efficient products.
6. Use Less Hot Water. ...
7. Use the "Off" Switch more often.
8. Plant a Tree. Whenever possible
9. Reduce use of fossil fuels.
10. Conduct energy audit and conserve

Green Gas Emission sector-wise



Green house gases can be controlled by

- Reducing energy consumption
- Using energy conservation methods.
- Making more energy efficient devices
- Building energy efficient buildings
- Using naturally occurring building materials
- Using green architecture and design

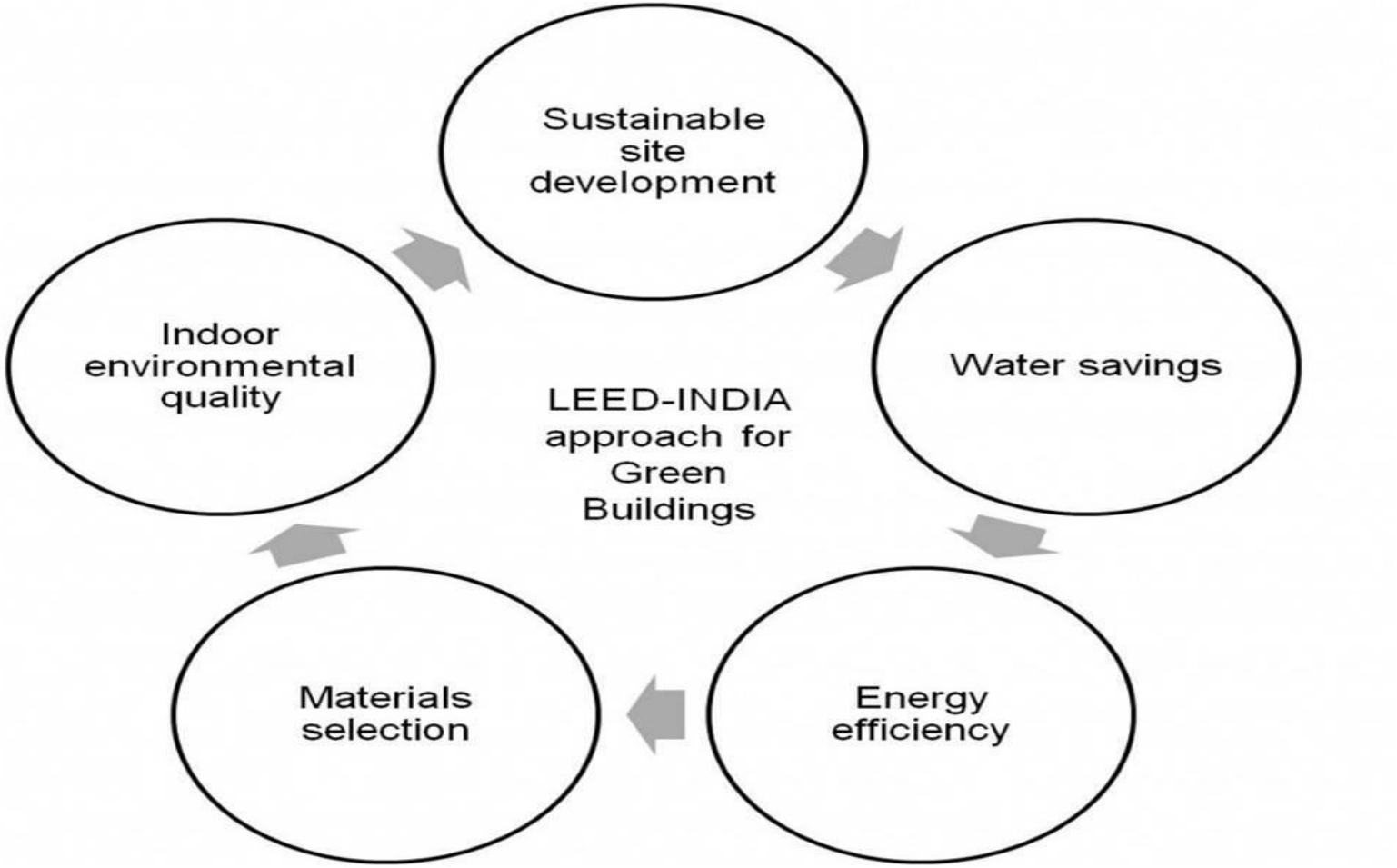
Green buildings & houses

- **Green architecture, or *green design***, is an approach to building that
- **minimizes harmful effects on human health and the environment**.
- The "green" architect or designer attempts to safeguard air, water, and earth by choosing *eco-friendly* building materials and construction practices.
- **Green architecture and design has the following important characteristics**

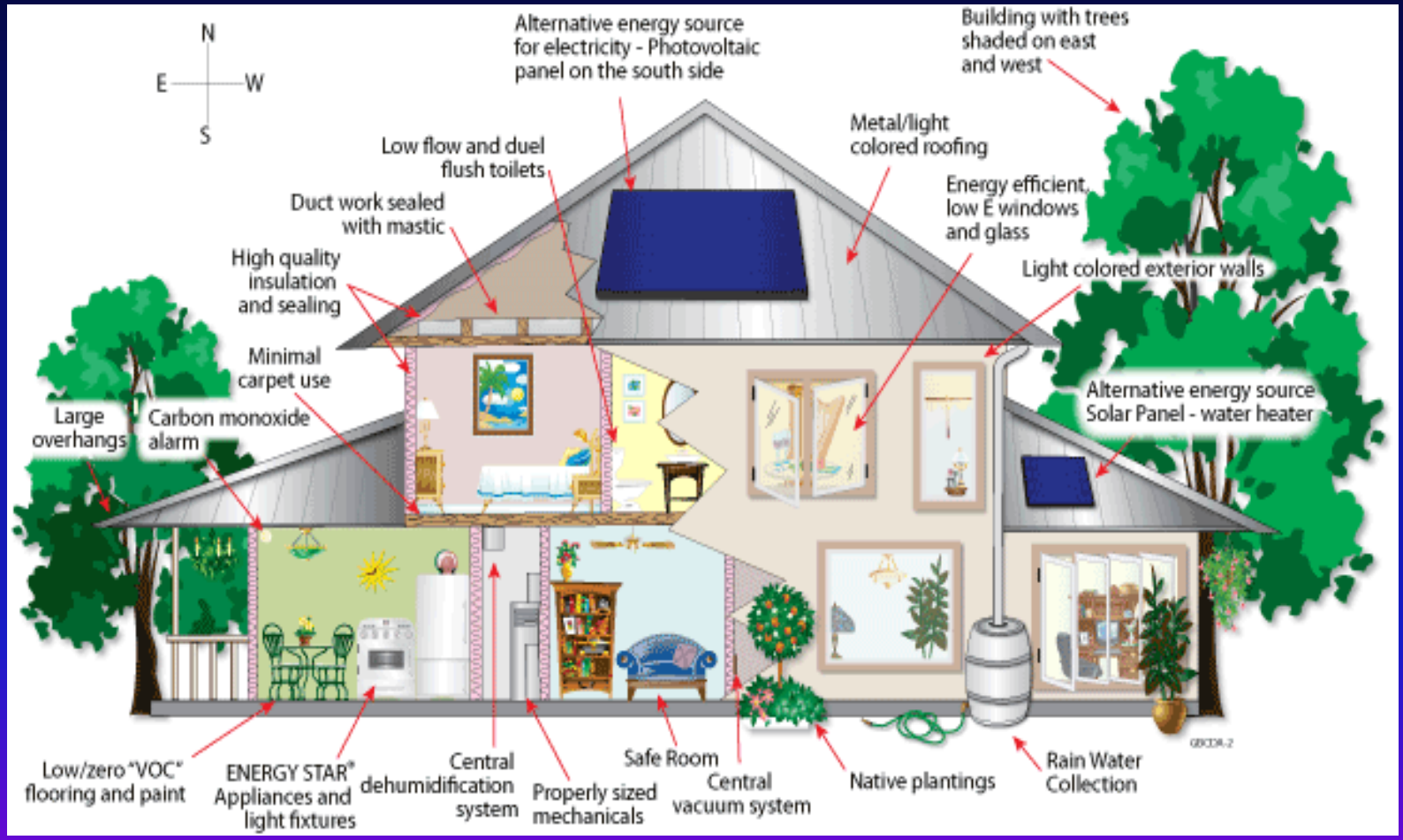
Green design will require

- Ventilation systems designed for efficient heating and cooling
- Energy-efficient lighting and appliances
- Water-saving plumbing fixtures
- Landscapes planned to maximize passive solar energy
- Minimal harm to the natural habitat
- Alternate power sources such as solar power or wind power
- Non-synthetic, non-toxic materials
- Locally-obtained woods and stone
- Responsibly-harvested woods

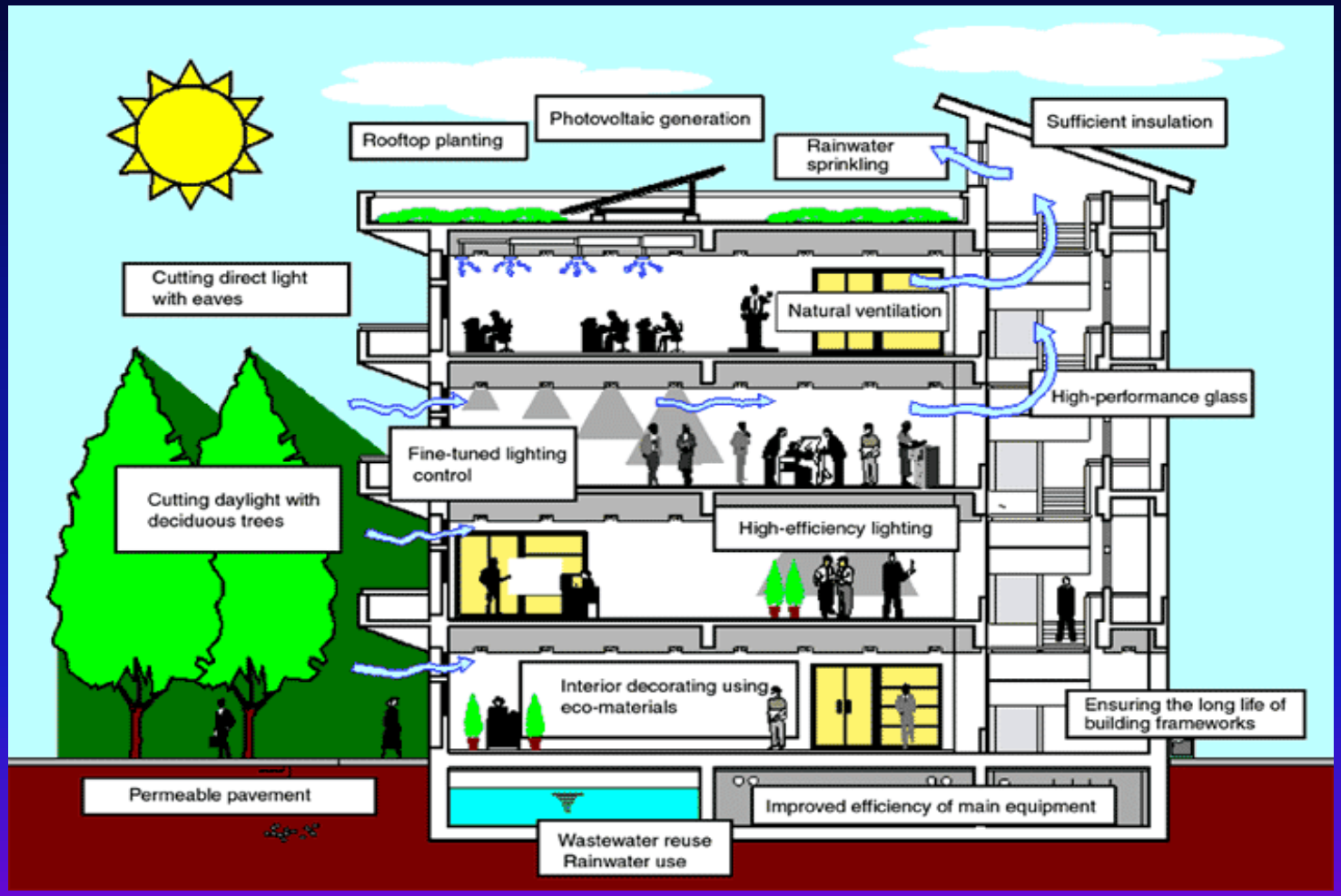
Green buildings India



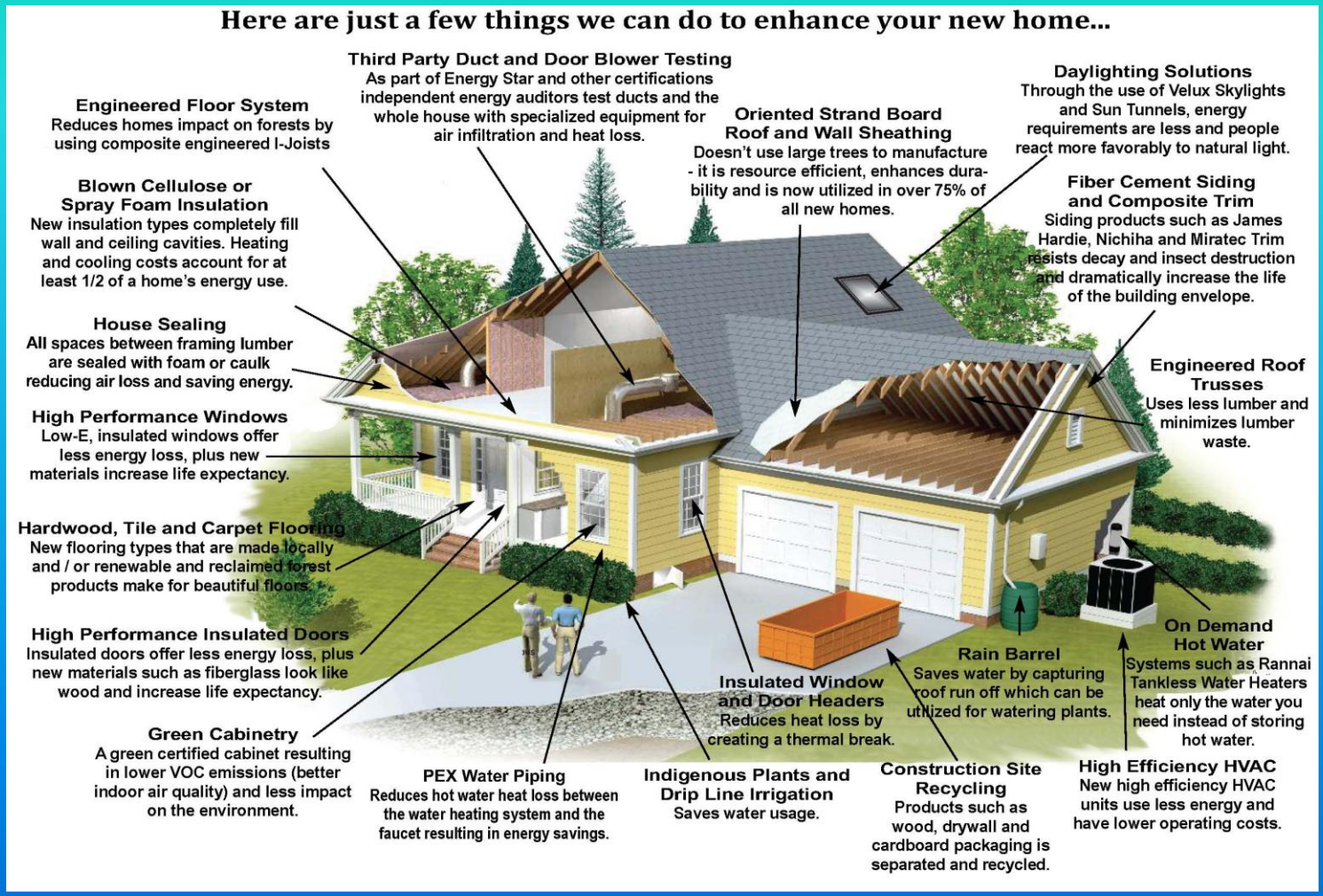
How to make a building green?



Green building - example



Use of green materials



Green materials

Benefits of green buildings

- Lower building costs
- Improved productivity by less number of employees becoming sick
- Green buildings have higher market value
- Healthy occupants in green buildings
- Tax benefits for green buildings (offered in many countries)
- Lower demands on electricity, water and gas
- Improved quality of life

SMART HOMES !

INTELLIGENT HOMES?

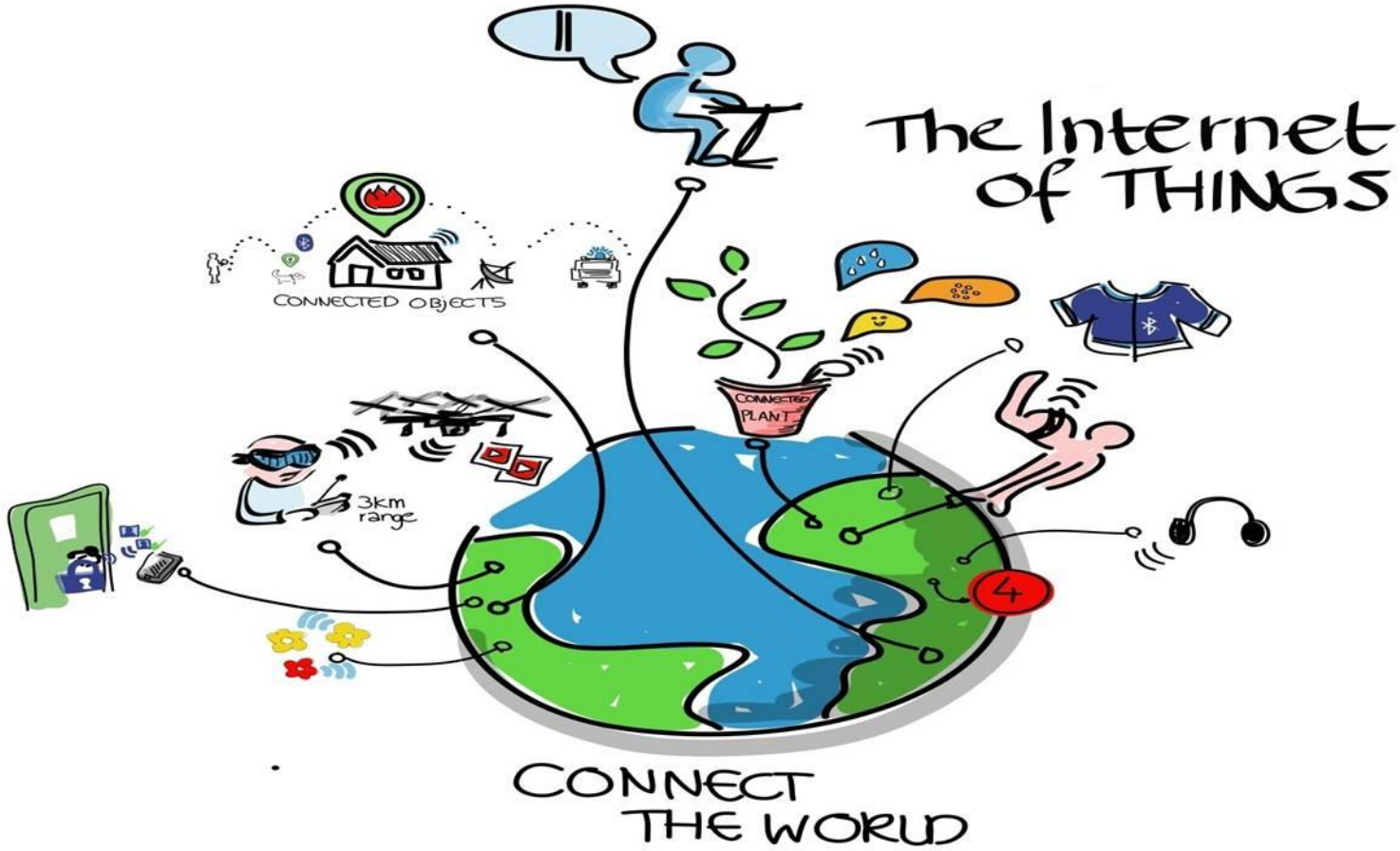
What is a SMART building?

- **A smart building effectively integrates building technology with energy systems**.
- These s may include **building automation, life safety, telecommunications, user systems and facility management systems.**
- **Smart buildings reflect the technological advancements and convergence of building systems, the common elements of the systems and the additional functionality that integrated systems provide**.
- **Smart buildings provide actionable information about a building or space within a building to allow the building owner or occupant to manage the building or space."**

Smart Homes ?

- **Smart homes are the future homes that use internet as a medium, or using the concept of Internet of things (IoT).**
- A smart home incorporates **advanced automation systems to provide the inhabitants with sophisticated monitoring and control over the building's functions.**
- A smart home may **control lighting, temperature, multi-media, security, window and door operations**, as well as many other functions.
- They make **use of a communication network that connects the key appliances and services, and allows them to be remotely controlled, monitored or accessed.**
- Smart homes make use of 'intelligent' feedback and information by monitoring many aspects of a home.
- **Essential that new buildings and homes are designed and constructed with these futuristic ideas in mind**.

Internet of Things (IoT)



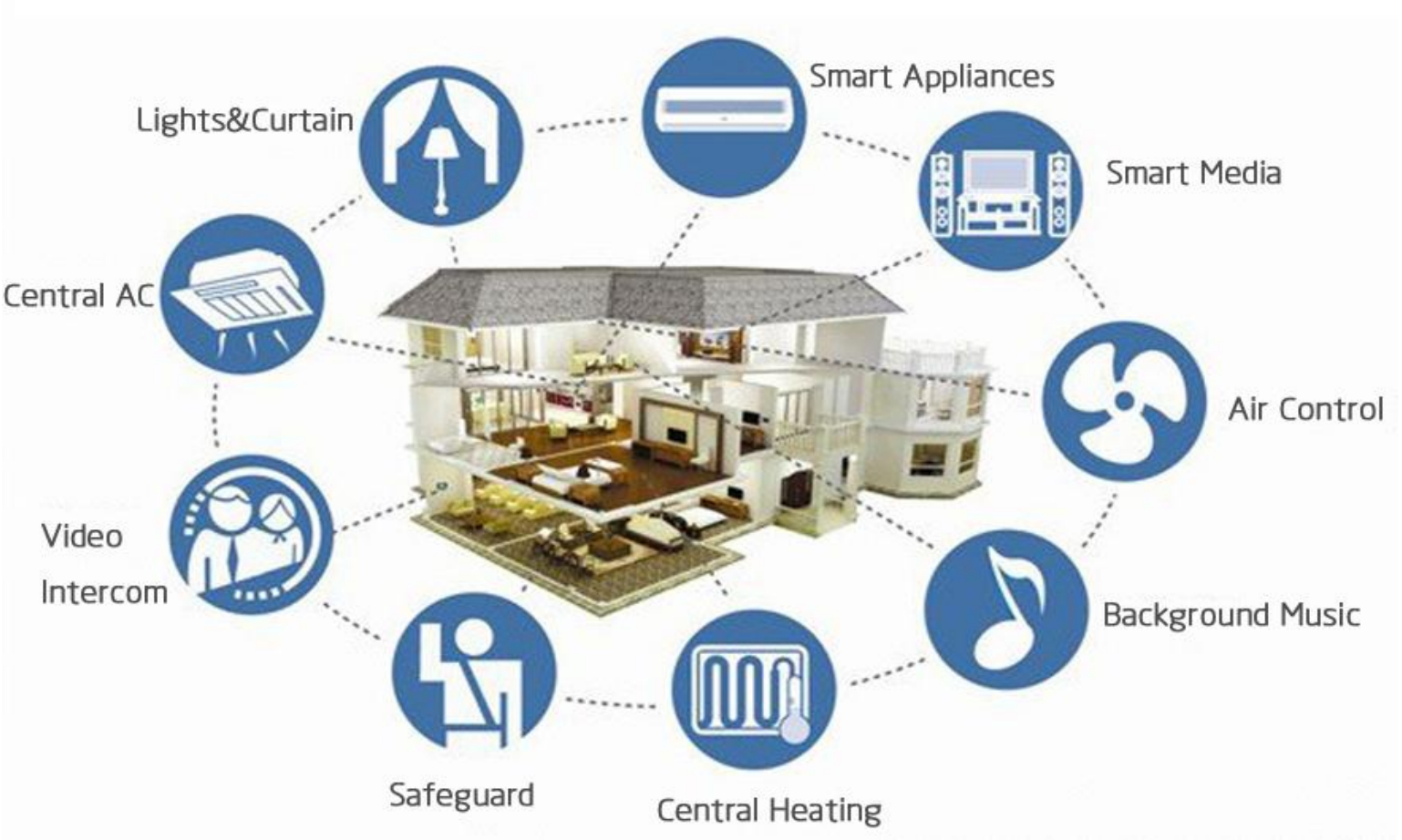
What is IoT ?

- The **Internet of Things** (**IoT**) refers to the interconnection of uniquely identifiable embedded computing-like devices within the existing Internet infrastructure.
- Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine communications (M2M) and covers a variety of protocols, domains, and applications.

IoT continued

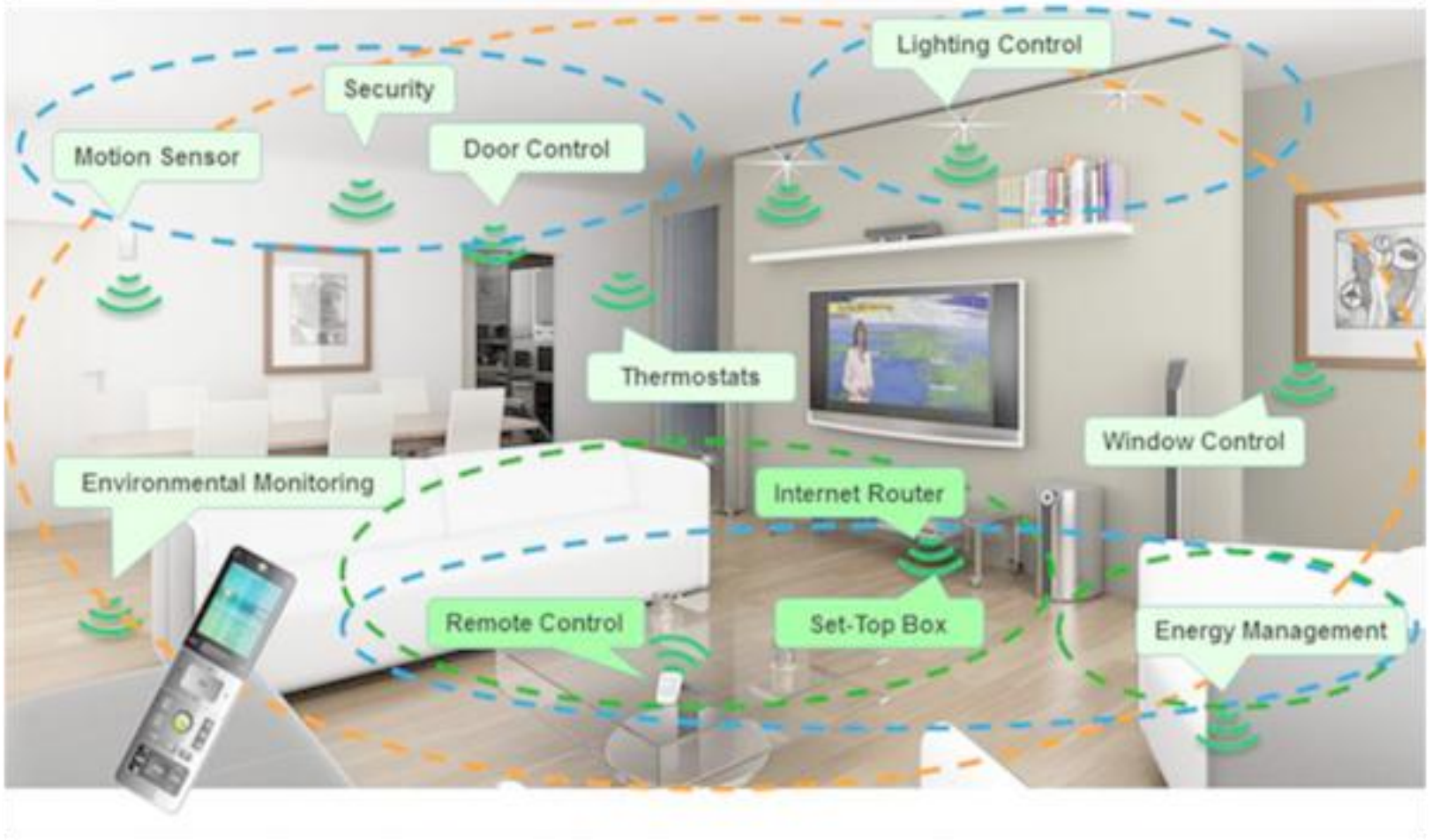
- The interconnection of these embedded devices (including smart objects), is expected to usher in automation in nearly all fields,
- Enabling advanced applications like a Smart Grid.
- IoT, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, automobiles with built-in sensors, or field operation devices that assist fire-fighters in search and rescue.
- Current market examples include smart thermostat systems and washer/dryers that utilize wifi for remote monitoring.

Smart homes - components

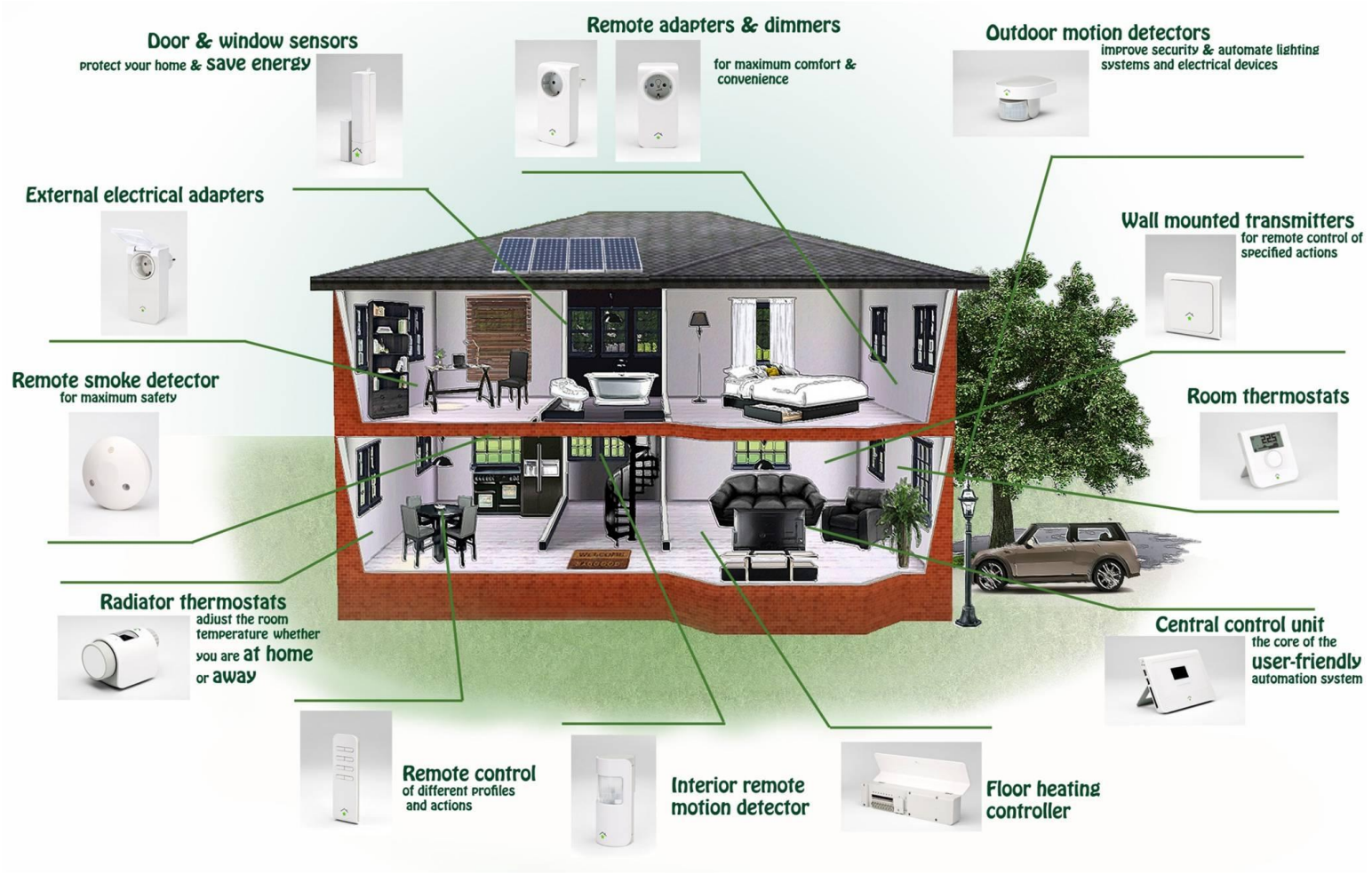


A typical smart home

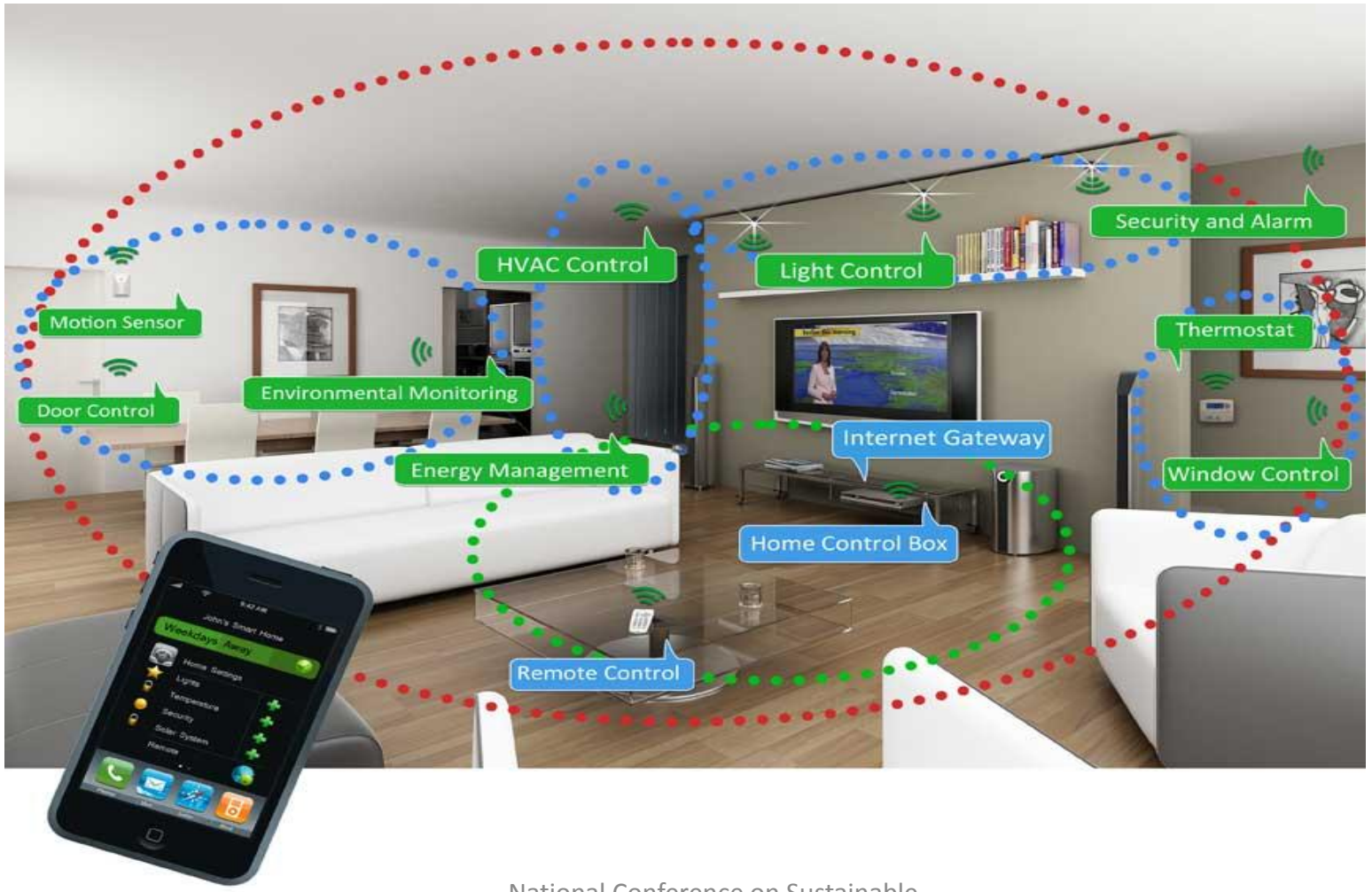
Smart sensors required



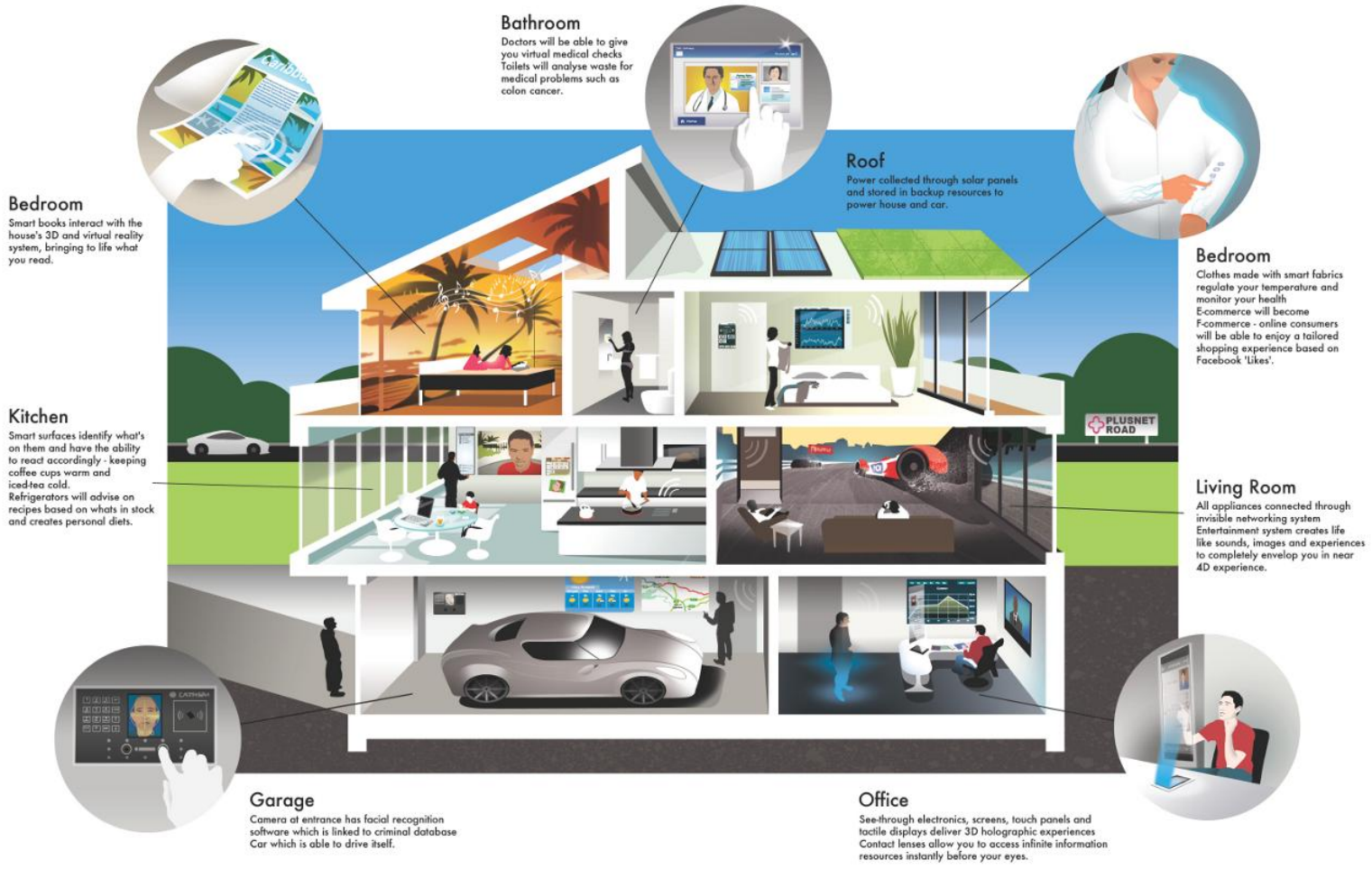
Smart sensors



Smart energy control



Smart (small) home



Benefits of smart homes

- **Convenience**
- **Comfort**
- **Security**
- **Accessibility**
- **Efficiency**
- **Energy conservation**
- **Care of the elderly**
- **Resale**

Summarizing

- **Green buildings**
- **are essential for helping the animals and plants on earth to survive.**
- **Smart homes**
- **can improve the comfort, control security and save energy.**
- **Both are required to make the life of our children less difficult**

Selected References

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Thank You